Newark Shop Notebook, Cat. 1174

This notebook covers the period July 1871-March 1872, with a few entries for 1874 and 1875. The majority of the notes and drawings are in Edison's hand and deal with the development of printing telegraphy. Some notes also describe experiments with chemicals for the electromotograph. Edison signed and dated most of the entries. The names of Joseph Murray and Samuel Edison frequently appear as witnesses. The front cover is labeled "Vol 6." The book contains 298 numbered pages.

Blank pages not filmed: 70-73, 76-151, 158-183, 186-235, 237-298.

E-1678 Contd
July 28, 1871 -
Feb. 18, 1873;
Jan. 8, 1875

Vol 6

1871 - 1872

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E-1678 1

Newark N.J. July 28. 1871

Record of ideas and inventions relating to Printing Telegraphs Which work with a Type wheel, all of which I am under Contract with the Gold & Stock Telegraph Co of N.Y. to give them subject to the Conditions of the Contract within the next Five years from the date of Contract Reserving for myself any ideas contained in this book which I do not see fit to give said G & Stock Telegraph.

This will be a daily record, containing ideas previously formed some of which have been tried some that have been sketched and described, and some that have Never been sketched tried or described

July 28. 1871. ~~Lower Stock~~ Electro Dynamic Power

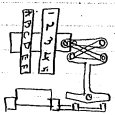


Fig 1

Double link motion for a shifting Type wheel, description unnecessary

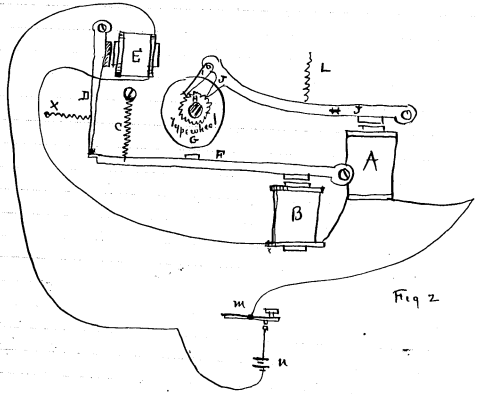


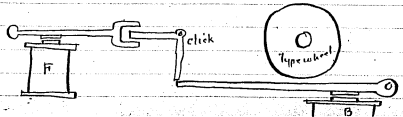
Fig 2

Printing Telegraph – to work upon one wire = The difference between this and most of the Printing Machines hitherto invented is the printing of the letter by the spring instead of the magnet as it is usually done, and preventing the printing lever from responding to the pulsations which rotate the Type wheel, by causing a lever of a seperate magnet to lock the printing lever when the pulsations are of any degree of rapidity. by referring to Fig 2 the principle upon which this printer work will easily be seen and will need but a few words of Explanation =

Having found in the Course of my numerous experiments that when a magnets armature is adjusted so close to the face of the core that it nearly touches that a current

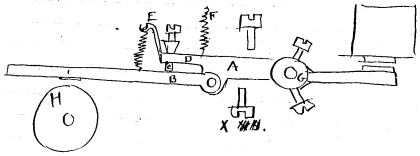
passed through it intermitted slowly it will stick or hug the core notwithstanding a considerable tension on a reacting spring. I have combined one of these magnets, adjusted in this manner with a printing lever arranged to print by a spring. E is the magnet which I will call the "Residual Relay" D is the armature lever X the reacting or adjusting spring B is the printing Magnet A the Type wheel rotating magnet, all these magnets are in one circuit in which is also the Key M or any intermitting Current device & the battery N. I is the Escapement lever H the ratchet G the Type wheel,

Now when the Current is sent through All the magnets The Magnet B pulls the printing lever F away from the Type wheel, the Magnet E pulls the lever D towards its core and the End of the lever locks the printing lever and the Magnet A rotates the type wheel, if now the key is opened quickly & closed quickly the magnet A keeps rotating the Type wheel, but the lever of the Magnet E does not respond to these intermissions, consequently the printing lever remains locked if now we wish to print we open the key for a moment Cut off all the Circuit from the Line, the Magnet E has time to discharge, The Spring X pulls the arm D back releases the printing lever, and the Spring C pulls it up and effects the printing, if the Current is now closed the lock action again takes place, and the Current can again be intermitted, the Type wheel rotated, without effecting the Printing lever. In practice I think it will be necessary to have a seperate clutch, click or lever to lock the ~~Type~~ Printing Magnet, and Knocking it out and in by the lever D, which will have dead play enough to acquire a Momentum, and Knock the clutch out, Thus

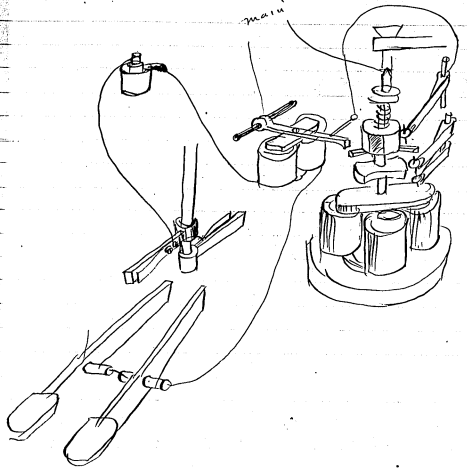


All foregoing written & drawn July 25 1871

Witness for T. Murray T. A. Edison



Jointed Printing Lever. The object of jointing the Printing Lever is to dispense with the device I have now on my universal Printing Telegraph Machine, which consists of an electrical Cam and throw over. When the Type wheel is suddenly arrested and the Current through the Printing Lever Magnet closed the A piece springs forward and the arm D & screw C kept in contact with the springy impression lever B by the spring E brings that forward, at the moment that the piece A is suddenly arrested by the screw X. the lever B springs forward by its momentum and impresses a letter and flies back till it comes in contact with the Screw C. When the Current is opened in the Printing Magnet all the devices fly back. It is obvious that the printing lever made in this manner will impress a letter instantly & fly back out of the path of the type wheel leaving it free to start of.

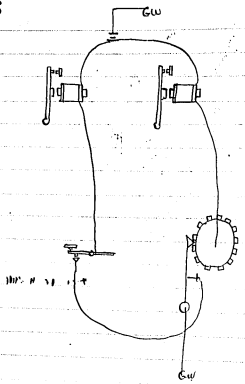


Device for arresting the rotation of the break wheel on my Universal Pta Machine by a Magnet instead of mechanically, a Description Unnecessary

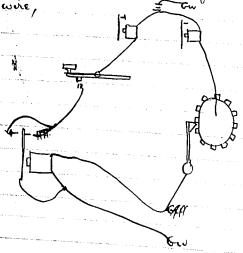
All previous

Written Aug 25 1871

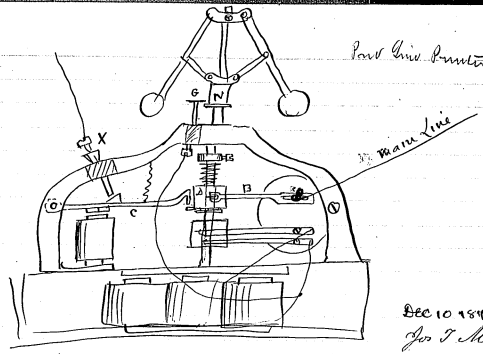
Witness for T. Murray T. A. Edison



Improvement in hand Transmitters, and their appliances, whereby The Second or Printing Circuit Cannot be closed by the key until The break wheel & point are on an open circuit =
The Sketch will explain itself, This appliance may be used with one wire,



Another Device to produce the same thing —



Dec 10 1881
Jos T Murray

Electric Pulsator for Printing & other Telegraphs & adopted on my universal Printing Machine,

The point X is insulated, and to it is connected the main Line. B is the break spring also Connected to The Main Line, when the armature Lever C, is up against the point X the frame & break wheel D is connected to the main Line So that when the Engine shaft revolves the wheel is carried around and at every revolution 2 breaks are made, but if now the armature lever C is drawn down by the magnet the Main Circuit is broken and the Wheel D arrested,

G is a screw mounted and having a disk on top Which disk rubs on another disk on the Governor slide when the Engine has reached a certain speed The disk G being Connected to the Engine magnets The current is cut off when the Governor brings the slide N up to the disk of G, or the current may be closed altogether & the magnet used to retard the motion and effect the regulation

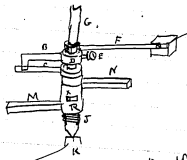
quickly or the Engine Current Can be cut or broken entirely

I do not wish to confine myself to using a disk as in G as the a lever might be used = or any governor, but I prefer this Governor as it is both electrical & frictional

Neither do I wish to confine myself to using a magnet whose lever opens the main circuit before it arrests the Break wheel thus insuring against a failure to arrest Said break wheel and prevent an extra break being made, as the magnet may be dispensed with and the same arrangement used as described in my Application for patent for my Universal Machine & the main line break attachment used,

I will mention here that the break wheel is ground with platina & the little wheels of the break springs are of Copper – also that I provide a Brush rubbing Continuously on these break wheels to keep the Oxydized matter off and keep wheel clean to insure Correct breaks

Following is arrangement on the type wheel shaft which brushes the path of the finger keys and is used for arresting type wheel & closing circuit of the arresting magnet on the Engine, and preventing further breaks being sent.



Dec 10 1871

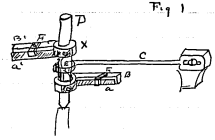
Jos T. Murray

G shaft D collar mounted F continuous rubbing

spring for bringing current to D & spring B. R is Collar with 2 arms N & M. has slot X with a stop pin in it connected to shaft to prevent the sleeve going to far around when arrested by a key. C is a spring on collar R. J is a spiral to return sleeve to original position before arrested by key. K is a Cluster in which shaft G works, The Collar R being connected to other end wire when a key is depressed and the arm say N comes in Contact with end of key while shaft is in motion the sleeve is slightly turned around into a distance governed by the pin in slot X; bringing the point B & C in Contact & closing the circuit =

following is another device,

Fig 1



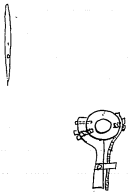


Fig 2

Dec 12 1871

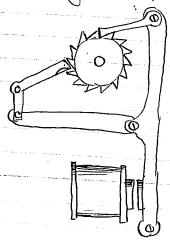
Jos T. Murray

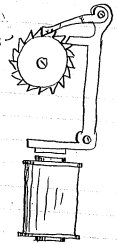
D is the shaft X a long Collar of insulating material with 3 Raised Collars on it the middle one having a brass ring on it and a wire leading from said ring to the two Connecting springs a a'; C is a spring for carrying Current to Collar and springs a a' B B' are and behind these springs to as to ensure the arresting of the shaft should the springs and key fail to make a good electrical Connection, F F' are Bridges. Connected to the arms B B'

to prevent the spring from coming out too far from the arm when the proper tension is placed on them,

Fig 2 shows how the arms and springs are secured to the rubber flanges,

Escapement for Printing Telegraphs.





Dec 12 1871
Jos T Murray

Devices for a two wheel printing Telegraph, figures and fraction wheel & letter wheel, and preventing one from printing while the other is. The principle is that the rim of the wheels are divided in 3 segments, and these segments have a space between them clear of about the distance of a space between the letter these segments are radiated out from the center to their full size, and then drawn in to a smaller size wheel, by the action of the printing levers, when ~~one is~~ the segments of one wheel is swelled or radiated out to its limits the segments of the other is drawn inward thus increasing the diameter of one and increasing that of the other

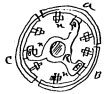


Fig 1

Fig 2

Dec 19 1871
Jos T Murray

a b c segments n n n studs on flange wheel with pins from segments sliding in them to guide segments. R arms with crooked slots as fig 2 for giving outward or inward motion to segments

Fig 3

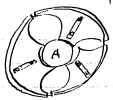
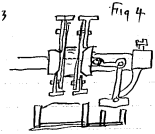
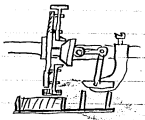
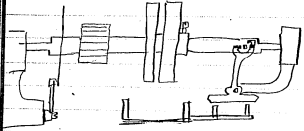


Fig 4





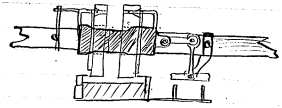


Dec 19 1871

Jno T Mercury

Shifting shaft

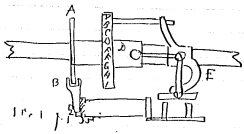
I piece stationary
Ratchet rotating shaft,



Dec 24 1871

Jno T Mercury

Loose type wheels with an inclined slide alone so that when shifted one wheel is made rigid while the other is loose. each wheel is provided with a flange (a) the Printing lever has two springs [flat] on each side so that when Ply lever comes up to Print the springs touch both wheels. but one being rigid bows spring down while other being loose the spring throws it up and keeps it away from paper =



The above drawing is a sketch of my locking device, The object of which is to place a number of my Universal Stock Printers on one circuit or circuits, and lock or unlock any one or any number from a central station upon that circuit, I will copy here a caveat which I have previously prepared =

" The object of this invention is to prevent any printing instrument among a number in the same circuit from Printing, all or any of them.

" The invention consists of an attachment to one of my Universal Stock Printers which work upon one or two wires according to the circuit devices used - The attachment is throwing the lock wheel by means of the shifting devices into a forked lock piece attached to the Printing Lever, which piece acts as a lock to the type wheel and also as a block or impedement to the bringing of the Printing Lever to the face of the type wheel and making an impression, The fraction wheel I have dispensed with, and use the shifting devices merely to lock and unlock the type wheels In these lock wheels there are a slight opening C. through which the type wheel lock arm passes at the moment of shifting, on every Machine composing a circuit The shifting devices are set in different positions so that one type wheel only of all the instruments can be shifted at a time, and unlike the ordinary mode shift all at the same time on all instruments, and also in this case I shift only when the type wheel lever is down and the magnet closed, and print when it is up

Thus preventing any of the type wheels of the several machines from shifting while transmitting a message to a particular instrument, which would be the case were I not to use a closed circuit on the Escapement Lever to do the shifting

I will mention here that after the lock wheel has been thrown into the fork, there is a slight dead motion between it and the fork which allows the Printing lever to come up towards the face of the type wheel far enough to release the unison but not enough to effect an impression or move the paper any great distance, this fork performs two functions the first, preventing the type wheel from jarring out or moving except in one position, and of preventing the Printing lever from effecting an impression.

I have previously said that I dispense with the figure fraction Wheel, but this is not necessary as a second shifting device may be attached to the ordinary Universal Stock which Second shifting device may be made to throw a disk in & out of a fork on the Printing Lever thus Locking & unlocking as is required, this second shifting device being operated when the type wheel circuit is closed while the ordinary shift device is operated as Commonly or formerly when the type wheel circuit is open,

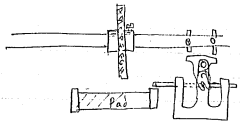
I do not wish to confine myself to any particular device for unlocking and locking, because they would be different according as they are attached to the various machines now in the market, I believe at this time of writing that I am the originator of the Idea of locking & unlocking a number of step by step Magnetic Printing Machines in one or more circuit from a central station

I am aware that Hughes has an arrangement for unlocking & locking his machines, but the machines used in the Stock reporting business, are on altogether different principles from the Hughes.

I will mention here that there are numerous ways of effect the lock and unlocking, both electrically and mechanically

One of these various modes is to have a severate magnet work a ratchet wheel, and this ratchet wheel having pins on it or upon its shaft may be thrown in the path of the Printing lever and prevent it from Printing as long as it remains, This magnet should be polarized - or have double helix and be effected by closure of both ckts.

Another mode is to dispense with the shifting of the type Wheel and its shifting devices on the shaft, and place them rigid upon the base attaching two pins only to the shaft thus



as in my shifting pad instrument, already Patented

A Cut in and out device might be used, this would consist of a polarized magnet working an Escapement, on the shaft of which an arm might project rubbing on a periphery of metal having one insulating opening, every instrument being provided with one of these, the insulated places being in different positions, and the magnet placed in the Printing ckt it might be made to revolve by intermitting a positive current and Cut out all the Printing magnets by reason of the arm remaining on the metallic ring and if it was desired to cut in any printing magnet the extra magnet would be rotated until the arm came to an insulated opening when the short cut would be destroyed and the Ptg magnet would be in ckt, while all the other machines would be out

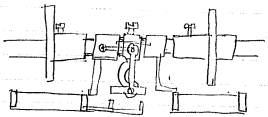
Then by using a negative current which would not effect the directive polarized magnet, the message Could be sent in that instrument. It is not necessary to Cut out the type wheels as they do no harm in being rotated altogether

This particular mode of cutting in and out electrically Can be varied in innumerable ways and I therefore do not wish to confine myself to that particular way

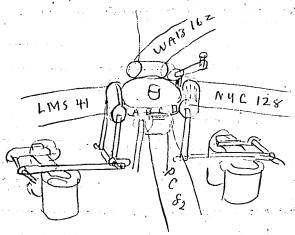
An Extra magnet not polarized might be used the type wheel Cutting that in and that cutting in the Ptg lever

53 Wright St, Newark N.J. Jany 2nd 1872 T A Edison
Jos J Murray

Since last writing I have made further improvements in the mechanical lock devices, As now constructed, I shift upon an opened circuit and at the same positions on all the type wheels, and not on a closed circuit as heretofore described, this makes it more practical and easier for the Transmitting Operator, The Unisons being all in different positions, it follows that if I wish to operate an instrument which says catches on the letter B I turn around a number of times to insure the stoppage of the Unison by the type Wheel and stop the transmitter pointer at B and close the Printing Lever and release the type wheel then of Course the type wheel & the transmitter Correspond, then I turn them both around until I come to the shifting peg then close the Ptg lever unlock the wheel and then transmit my message - In case some one of the Printing Machines did not happen to lock or got out accidentally the type wheel would not Correspond with the transmitter so the message would only be a jumble of unreadable letters, but be ok on the inst which the message is intended for, I could dispense allogether with shifting and locking of the Ptg Lever, as every inst would print a jumble of letters except the inst which it is intended to receive the message, but I prefer to lock the Ptg Lever, saving paper, and, as being more seemly & Convenient, I will state here that over a year ago I suggested to Genl Beffutt Should he wish to work an number of Private telegraph Printing Instruments on one circuit between a firm: office & factory Every pair of such instruments might have type wheels to Correspond but every other pair have type wheels similar but the letters placed in different positions So that no firm on the same Line could read the message of another firm -

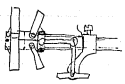


The above sketch represents a Printing instrument which has two type Wheels and Prints upon two strips of paper, this is done by one magnet working two printing levers or a seperate magnet to each lever but both in the same circuit and locking one or the other by the shifting device and arms,

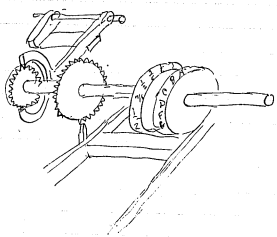


Device for Printing with a number of Printing levers from one type wheel, a seperate wire runs to each Printing magnet and one wire for the type wheel, The type wheel is rotated by a break wheel, A transmitter the used in sketch is a device which the type wheel may be arrested at any desired point by depressing a key, independent of the others in the same Circuit, The Speed is greatly increased with this device

Jan 4 1872 T A Edison
Witness by Jos J Murray

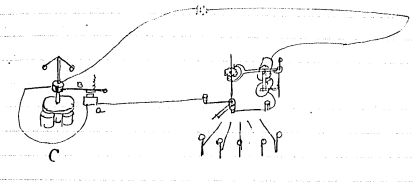


This is a double Type wheel having each wheel split in 3 or more segments and the inner ends pivoted on a set sleeve on the shaft. When the shifting device is thrown one way the segments of one type again a complete wheel ready for Printing while the segments of the other are thrown off at an angle thereby making it smaller than the other wheel.



Union Device, Extra 8 tooth wheel with a space where there is no teeth, when the Escapement lever is up and circuit open the prong on the Ptg Lever fits the teeth in extra wheel, no effect is produced & the Ptg takes place as usual, but if we wish to rotate the type wheel to Union should it be out we close the Escapment Lever circuit & bring escapment Lever down in so doing we bring the V teeth of second wheel in such a position that the prong on the Ptg lever when that is brought up will shove the type wheel around half a letter lifting the Escapment Lever out into half next to oth. & when the printing lever is let down the magnet working escapement which still continues closed brings escapment lever

down again and places teeth of second wheel again in a position to be thrown forward by the printing lever & so on until it comes to a place where there is no teeth then it is to unison, then open the Escapement lever circuit & go ahead in an open circuit in the usual manner, until you wish to catch all the instruments at Unison, then close circuit & work Printing lever until type wheel stops.



Arrangement for furnishing "breaks" for a whole line of Printing Instruments from a central station, by means of my Engine break already described in my Universal Printer Patent (and Caveat) This engine is of the same make as described on page 7 of this book but in this case I dispense with breaking the main circuit by the points on the armature lever of the letter arresting magnets and I also make the armature lever arrest the break wheel on the up stroke (10) when the magnet is open, and not closed as employed in the usual manner, I also include this magnet in the main circuit, so that every tho time the engine makes ~~two~~ one revolution two breaks are made and of course the arm of the arresting magnet vibrates with it but does not arrest the wheel. Now I provide the Type wheel shafts of the several instruments with projecting arms which pass in the path of keys now when a key is depressed the arm revolving around by the action of the Escapement ~~on~~ & magnet which receives to breaks from the engine break at the Central station, this arm is made of two springs in contact when revolving and are connected to the main circuit in such a manner that when this arm is arrested by the ~~key~~ the two springs are separated and the main circuit

opened, at the moment that this occurs there is not current on the line it being so adjusted that it will be at the interruption of the current on the break wheel = Now there being no current on the line the armature lever of the little arresting magnet stays up and catches the break wheel and arrests it, not on an open circuit but just as it commences to close, this insures a full break when the key is raised, for when it is the circuit is instantly closed the little lever is let down or drawn down and the break wheel revolves as before & so on, The Receiving instrument can have a vibrating point & Local Battery Connected with the Printing Lever So as to receive any message which may be sent, but I do not use any spring on the sending instrument, as I wish to dispense with a Local battery although it may be used =

I

In the instruments and lock devices just explained but one instrument Can be used at a time

But a shifting device might be added which would shift on a closed circuit on the Letter Z and a double unison made This shift might be made to shift and throw one unison out and the other one in the first unison for working a single not and the last to work them all, The last being set on all units alike the former at various places, Where it is necessary to work both the letter wheel and Figure wheel I add an extra shifting device for locking and unlocking =

I will state here that I lock on the fraction dot open circuit & unlock on the fraction dot closed circuit = on my Lock Instrument =

Jany 6th 1872. T A Edison

Witnessed
Samuel Edison

I am requested by General Lefferts to invent a peculiar unison for what is known as the Callahan 3 wire instrument

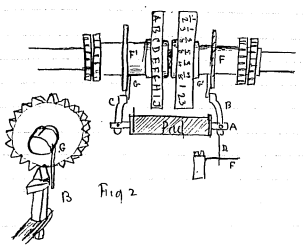


Fig 2

A is a slide peice which moves very freely through the pad or one side of it and is prevented from turning by the wire D passing between two guide wires F secured to a pillar =

Upon this slide is secured two peculiar shaped click B C. Fig 2 shows one of them to better advantage

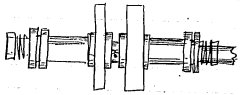
F F' are two star wheels secured to the two different Sleeves of the type wheels, and these wheels act the same as the unison device shown on page 18. Some of the teeth of the star wheel being cut out at a given position = G G' are pins secured to the Type wheel sleeves just back of the dots or Zero points = The purpose of these pin is to throw the slide and its clicks under one star wheel or other = Supposing both wheels to stand at Zero then the slide will be in a position where one click is directly underneath the star wheel of one type wheel and the other is thrown out one side, Now supposing that the letter wheel was in unison But the fraction wheel was not = Now when the Operator starts to rotate the Letter wheel, the pin G will come on the bevel of the click C and throw the Bar A over and bring the click directly underneath the star wheel of the Figure type wheel, which the star wheel of the Figure type wheel is out of Unison, (Bad drawing shows both under) Now the first Letter printed the printing Lever comes up

The click B, coming into the star teeth throws the type wheel ahead one letter and will continue to throw it ahead at every movement of the pouling lever until it comes to where there is no teeth on the star wheel then the type wheel will be at zero, Now as long as you work on the letter wheel the slide will remain over to the figure wheel side, but if not now the operator brings the letter wheel to zero, ~~or what~~ or tries to, and it is 2 letters behind and commences the rotation of the figure wheel, the first forward movement of the fiqure wheel by the aid of the pen I throws the slide over the click under the star wheel of the letter wheel that wheel will be brought to zero by the first two upward movements of the Printing lever

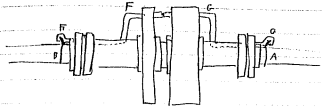
The whole thing is this B, a clicks is a "Connector" when one type wheel goes around it throws ~~B~~ the slide under the other for connecting the wire ronna

I do not wish to confine myself to a star wheel & V shaped click as I can use a ratchet wheel and ordinary click

Neither do I wish to confine myself to a sliding bar with Clicks on the Printing lever as the star or ratchet wheels may be made to slide by the action of the rotation of the type wheel and an arm or other devices accomed outside or independent of it.



Another union device each sleeve being provided with two little teeth slightly Bent and a pin on the shaft, If one wheel gets out of union the other wheels tooth grabs the tooth on the other wheel brings it up to the pin and they are then parted if one wheel goes ahead

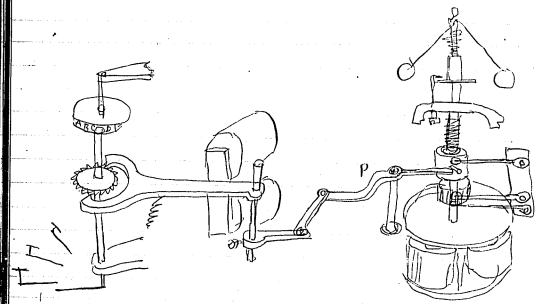


A B are flanges bent slightly at the union point F G are Carriers for locking the rotating wheel with the wheel to be set = one end of each has a head with a slot in it which works in the flanges A. B. When a type wheel is rotated around this carrier is thrown forward but is brought out of the path of the other Carrier between the type Wheels by having a portion of the flange A B bent outward just at the union point or last one or two Letters, It is not necessary to bend the Carriers up to the periphery of the type Wheels as I have shown =

Jany 8 1872 T A Edison witness Samuel Edison

Universal Machine = Instead of using the two arms and Connecting Springs upon the type wheel shaft and being in the path of the Keys The Connecting points for closing the Little Magnet in the Pulsator may be dispensed with and straight arms only used - When this is done I put a wheel having 30 fine points of Contact insulated between & Connected so as to revolve with the type wheel shaft, rubbing on this wheel is a Spring Connected to the pulsator Magnet so that by depressing a key the plain arms suddenly arrest the type Wheel and the Contact spring, just comes on a Contact point of the tooth wheel, and the pulsator wheel is arrested by the Little magnet, The type wheel shaft being arrested just a little way from its Limit the key being raised will allow it to reach its Entire Limit rotating the type W shaft a little & severing the Contact point, On account of the Speed with which the wheel is rotated, the spring though touching a point every Letter does it so quick that it has no effect on the Little Magnet

of the pulsator, but only when arrested for a small period of time
It is not necessary to use a Contact wheel with 30 point
as a rubbing Spring. A single spring secured to the shaft of the
Escapement Lever might be extended out some distance and
made to Close against a point just as the Escapement
Lever was nearly home or an open circuit.

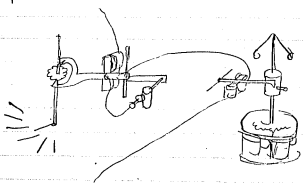


Improved method of catching or arresting the Little break
on the Engine in my Universal Printer, heretofore I have arrested
it first by a movement derived from the arresting of the pin
on the type wheel shaft, and the movement of that shaft
Secondly by closing a secondary circuit by arresting a
point on the type wheel and closing a magnet. the
armature of the magnet arresting the break
wheel, Thirdly the manner which which I describe
on page 26, and Lastly the above, The arresting of
The break wheel in this case is done by the direct
action of the Escapement Lever, The movement having
nothing to do with the type wheel shaft
I best only thing used as a means of stopping
the Escapement Lever at certain points by the
action of the points on the shaft going in the
path of the Keys and by the aid of the ratchet or
star wheel. it

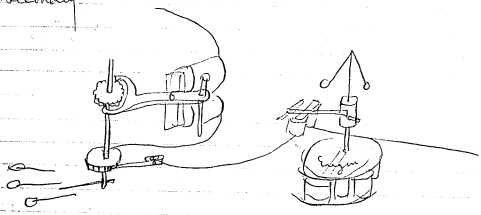
It will be seen by referring to the drawing that a lever
is connected to the Escapement Lever and that the end of
this Lever is in or out of the path of the ~~[illegible]~~ little pin
on the break wheel according to the position of the
Escapement Lever. When the Engine is running
it every half turn of the break wheel the magnet
operating the Escapement lever is closed consequently
the Lever P, is thrown into the path of the pin
on the break wheel and would arrest it, but the
break is so arranged that just as the pin is in
the act of being arrested the circuit of the Escapement
Lever Magnet is interrupted by the break and the
Escapement Lever flies back by the action of the spiral
spring and throws the arresting Lever P out
just in time to prevent catching on the pin
and the circuit is again immediately closed
the Lever is thrown in then jerked out every time
the type wheel advances one letter, ~~or if used~~
~~on Double ckt opens & close~~ consequently
the break is not interrupted but if we close
a key the pin on the type wheel shaft comes in
Contact with it, the Escapement Lever is
arrested half way which and the Lever P held
in the path of the pin on the break wheel
and the break wheel is arrested, now when
the key is raised the Escapement Lever is allowed
to go its full mension the Lever P is drawn
out and the break wheel revolves as before.
I do not wish to confine myself to any
particular lever, but claim arresting a
break wheel by a movement from the Escapement
Lever or any device attached to the Escapement Magnet
and holding the Lever in the path of the
~~type~~ Break wheel by arresting pin or pins
on the ~~type~~ wheel shaft by key or other
devices & Could used a seperate magnet
to arrest the Break wheel and place
it in the main circuit and put a

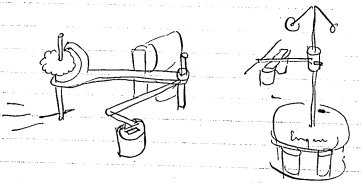
break point on the Escapement lever and arrest half way thereby opening this Extra Magnet and arresting the break wheel or put a wheel having 30 contact points on the type wheelshaft, and arrest the wheel by the keys & pins in such a position that the break main circuit would be open

This first

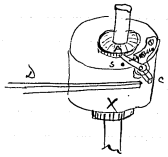


Secondly



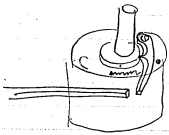


I will mention here that the friction cloth & spring used on the Engine shaft for friction to carry around the little break wheel might be dispensed with, and a clutch or click used the clutch being thrown out by the action of the arresting lever, this click or clutch would be provided with a stop so after the click had been thrown out a short distance it would come against a stop and the wheel would be arrested, one form I have since



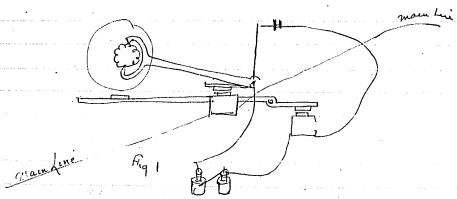
A is a milled wheel screwed to the revolving shaft
C the click X the break wheel S the arresting lever
S a limiting pin

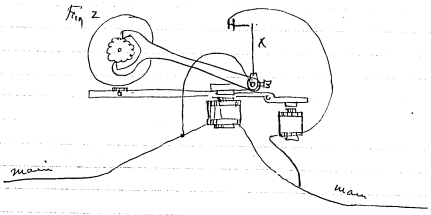
When the lever is not in the path of the break wheel pin the click is drawn to the face of the Milled Wheel by a spiral or flat spring thereby locking the break wheel to the revolving shaft, now if the lever S is depressed the point comes on the click thro immediately is thrown out and the limiting pin S stops the click from going out further and the wheel is stopped,



Another form

Attachment to the Universal Stock by which with the aid of a local it can be worked on one wire, or can be worked without a Local





The points X are adjusted so that when the Escapmt Lever has reached nearly the whole length of its play the contact point just touch, now when the Escapment is rotated rapidly the printing lever does not respond — In Fig 1 the Escapmt stops on an open ckt in Fig 2 on a closed circuit

Jany 13 1872 =

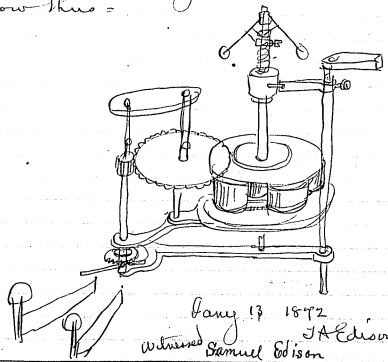
T A Edison

Witness
Samuel Edison

Wire Parking Printer

I wish it understood here that I can easily combine my Pulsator and arresting devices now used in my universal machine, to any form of Printing Telegraph (or) attach it or to any mechanism operated by step, or step motion or Escapmt, Rotetil Motor, or release escapmt or weight or other power or I can combine it in the form of a transmitter only in many different ways dispensing with the type wheel Ptg lever & printing devices,

I mention here, that I can gear up directly from the Engine, and on the last gear wheel shaft put a pin or arm or detent revolving in the path of Keys, and connect this arm with a V shaped wheel working an arresting lever Connected so as to arrest the break wheel on the main Shaft of the Engine, this wheel being carried around by friction, thus making a transmitter, The Universal as it is now operated can by modifying the arrester & platinizing the point on the break wheel be made to close a secondary circuit thus Enabling to work instruments which use two wires, The geared transmitter I show thus =



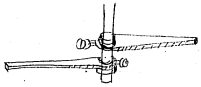
Jany 13 1872

T A Edison

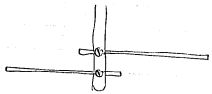
Witnessed Samuel Edison

It is of course obvious that my Universal Could be operated upon an open & closed circuit (ie) by opening the Circuit advance the type wheel one Letter and by Closing advance another Letter, but I prefer to use both opening & closed to make a letter it being on my Opinion More practical.

The pins on the shift of the Universal type wheel opening a Little and might be made in this way



Instead of



I claim a dead motion or the use of a dead motion in a star or wedge acting escapement for the purpose of giving the printing lever time to get away from the type wheel before it starts & not slurring the Letter, I believing myself the first one who discovered or used the method, other parties, (Phelps & Gray & Barton) using devices for throwing their printing levers back to the type wheel & then quickly back they not knowing this are wholly unnecessary provided there is a slight dead motion in their Escapement which they generally do

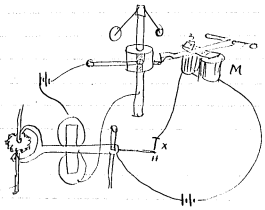
I claim the use of paper in a ~~Prin~~ single wheel Machine. 5/8 of an inch or more wide, when such paper is used with my paper drawing devices, or in other words I have found that 1/2 or less paper cannot be drawn or worked practically in a printing Telegraph which is operated by inexperienced persons

I do not wish to confine myself to any particular form of Electric Engine in my universal, nor even to an Electric Engine as the break wheel May be drawn with gearing or any other device operated by any force! Or the revolving wheel Can be dispensed with and a Vibrating lever used, operated by a local and this self Vibrator opening & Closing the Main Current and the arrester used same as that for arresting breaks wheel heretofore described and this arrester made to stop the Vibrating Lever or to open its current by a Contact point. Or the breaks may be furnished by a clock movement or any other devices, and the arrester made to act Electrically (ie) open the Main current so that when arrested in a certain position it will open the Main current & prevent any more breaks from being sent over the wire & when released allow the breaks to be sent. In fact a point connected to the Escapement lever of any permitting Telegraph Can be made to Control the devices which furnishes breaks by arresting it in certain points of its motion as well as to control the printing lever —

Jany 13 1872. T A Edison

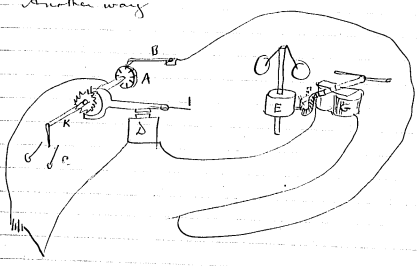
Witness Samuel Edison

I do not wish to confine myself to any particular method of annealing the break on my Universal, I can be done this way.



X and H are vibrating points work so quick dont allow current in arresting magnet long enough to close lever but when Key depressed and shaft arrested Escapement lever closes points X & H allows Current to circulate through M long enough to bring armature down and arrest the break wheel,

Another way

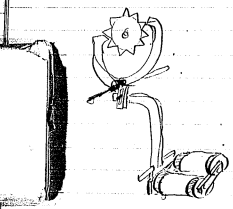


K is the shaft with point arrested by Key C A a break wheel with black points made of insulating substance, B a spring the points

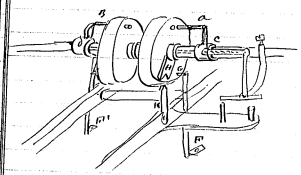
on the shaft is placed in such a position that when arrested the point B will be in one of the insulated parts of the Wheel A, The insulated points always passing under the spring B when the main circuit is broken by the break wheel consequently the breaking of the main circuit by the wheel A & spring B does not effect the regular pulsations, Now the magnet G being in the main circuit ~~being now~~ it vibrates its armature & anneals the same as the escapement The annealing lever going in & out between the pin on the break wheel twice every revolution or as many times as there is breaks on the wheel but does not arrest it, but if now a Key is depressed the break wheel A is arrested and the circuit is broken and the annealer is thrown or rather is not drawn down and the break wheel is arrested on a closed circuit but the circuit remains broken at B & A If the Key is raised the escapement is drawn a slight distance which the Key prevented and the circuit is closed the arrested lever is drawn down and the instrument goes on until arrested by another Key being depressed The Wheel A & spring B might be dispensed with and H under patent break substituted by putting it on the Escapement and so connecting it that when the Escapement lever is drawn to the magnet the circuit will be closed but when it goes back it will be broken I can use any devices to do this Several of these devices were described in a former caveat relating to Vibrating devices which at the time I intended to use on my Universal instead of the Engine,

June 15 1872 — 7 H Sims in

Witnessed — Jos T Mowry



Escapement



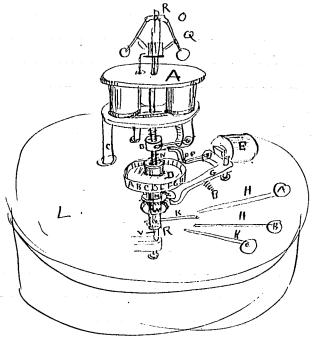
Two loose type wheels clutches a B c d connected together by two arms running in slots planed in the shaft. Type wheels are provided with two holes into either the clutch. Can be thrown by the shifting devices. H is an arm with a V cut in it underneath on the. Pty Lever is an arm K which goes in this V in H. The same is on the other wheel F' F'' to a retarding Spring G etc is a pin from type Wheel to hold it in position when it is unlocked or not carried around. The Operation is simple. If one wheel is locked by shifting the other wheel will stand one letter from Zero. But the arm K on the pointing lever ~~this~~ acting on H Carries the type wheel one notch to Zero in the act of unlocking ~~the~~ the type Wheel which is thus unlocked

and carried forward is prevent from wiggling ahead by the spring F' & pin G, but when this wheel is again locked, the force of the Magnet is plenty to overcome the spring F' and the type wheel is rotated.

Jany 17. 1872.
Witnessed =

T A Edison
Jos F Murray

A Printing Machine in which the Engine carries around the type Wheel, and the Escapement Lever on suitable



A is the Engine set up on pillars c etc R is the shaft driven by the Engine. Q is the governor, D is the break which arrested in the manner before described by a Connecting Link for F from the Escapement Lever G. This break wheel is arranged just the same as heretofore described. D is the type Wheel N the friction wheel Carries this type wheel around. When the Engine shaft R is moving. This type wheel is provided with a Long screw W which passes in the shaft R down through the

Base nearly to where R is pivoted & being prevented from going further by the pin V or any obstacles, (this position might be peculiar this) now this sleeve has on the release toothed wheel M the vibration of the Escapement G releasing the type wheel after the manner of a clock escapement, this sleeve is provided with an arm K which passes on the path of Keys and may be arrested by the depression of any key. Now when a Key is depressed the Vibrating lever G is held in such a position that the arrester F is thrown into the path of the pin on the break wheel and arrests it and the Machine at the other End is arrested by the stoppage of the break wheel and the consequent stoppage of the vibrating lever & release of type wheel

The break wheel might be connected directly with the type wheel in this case and the Lever F dispensed with, this simplifying it, but it would have to have 30 breaks, or as many as there are letters & figures.

The Escapement might be dispensed with also and a simple magnet with vibrating arm which vibrates in the path of the pin on the break wheel, When the Key was depressed on the transmitting instrument it would arrest the break wheel & type wheel on an open circuit, consequently the vibrating arm at the distant station would be arrested and arrested the break wheel & type wheel of that Machine & when the Key was released the sending machine type wheel would immediately start off & the breaks be sent over the wire & the magnet & its arrester commence to vibrate, this arrester is not only used to arrest the break wheel but to prevent the type wheel from going faster than the sender.

Jany 18 1872. T A Edison

Witnessed Jas F Murray

For printing fractions, the type wheel be made thus

The strip would read

NYC 125 3/4 .... WAB 64 3/8 .....

Or the type wheel could be arranged thus

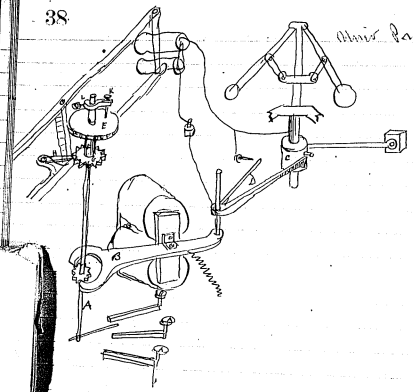
The 8.4.2 being cut on the type wheel where the spaces should be and to permit them strip in a closed circuit.

or it could be made thus

& the strip read thus

NYC 124.7 E ... S E ....

Jany 20 1872



Device or attachment which I use on my universal machine for printing Correctly when the type wheel is stopped by a Key a Little out of Line,

In my universal printing Machine, when sending the type wheel shaft is arrested by a key on the open circuit and a Little before the Escapement lever throws the type wheel to its proper position for printing, I do this to obtain a slight movement of the Lever B after a Key is raised so as to release the Break wheel C by the arm D. But in doing so the type wheel would be stopped half way between a Letter when the printing Lever Came up would print 1/2 of one Letter & 1/2 of the other Besides and objection would arise which is that it would be necessary to move the type wheel forward a half a Letter before the Circuit of the printing Lever would be opened Now this it couldnt do

Consequently the whole machine would stay Locked of Course the printing Lever might be thrown forward and the momentum print the Letter & fly back out of the road, or a device could be used so that when the type wheel was arrested the printing Circuit would Close for an instant print the Letter & Cut itself out until the next Letter, I have used ~~it~~ such an arrangement on a previous model of the Universal but Consider them all objectionable Now in this devices now being described the Key arrests the shaft A 1/2 way home consequently the type wheel is not in a Correct position to print, now to make it print Correct I use a Connector G on a sleeve F on which is Type Wheel F and guide pin K and holder L the slot in the holder has dead motion Enough to allow the type wheel & its sleeve a loss motion or play of more than a half a Letter, H is the Connector detent, wedge acting & Connected rigid to the printing Lever, If now a Key is depressed the shaft A is arrested 1/2 way home the printing Lever Closes the detent H acting in the wheel G ~~the~~ takes up all the dead motion of the type wheel on the shaft and throws it forward to the right position for printing, Now the shaft after the Key is raised Can go forward & open the Circuit of the printing Lever without moving the type wheel this allows the printing to fall back just in time to let the type wheel go forward In returning nothing is arrested Consequently the type wheel Comes right Every time or if not the Connector will Correct

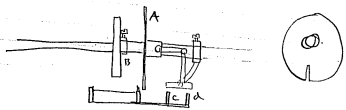
The Connecting wheel and detent

should be made thus

This shaped tooth allowing the detent to Connect the wheel then go ahead a little further to allow the printing Lever to print without moving the wheel.

I do not wish to confine myself to any particular devices for Connecting the wheel but claim a dead Motion of the type wheel upon the shaft so that a forward movement or a backward movement can be given to the type wheel by the action of the printing Lever

Lock device



A is a disk, B the type wheel C d the adjusting pins When you lock rotate shaft so as to bring the the disk on on printing lever and presents it from Coming up to unlock advance to C release the lever

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June 30 1872

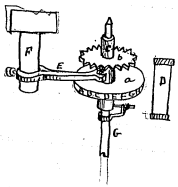
Jos. G. Murray

I mention here that on my universal the click on the printing Lever which Connects the type wheel should be a little springy at least Something should give, I have so fixed it already.

New Device on Universal

I use the connecting device, and closing the Local Circuit both on the vibrating spring on The arrester, But Combine another point of closure for the Printing Circuit when Transmitting Underneath all the keys is a plate this plate is insulated and so Connected to the switch which I use that when Transmitting the Local of the printing Circuit Cannot be closed until the arrester Comes in Contact with the pin on the break wheel and a key is depressed & in Connection with the Insulated plate before mentioned Now when the key is released the Circuit of the printing Lever is broken before the arrester arm is allowed to release the wheel so the printing lever gets away from the type wheel before it starts which is necessary as the printing lever pressing against the type wheel puts a large amount of friction upon which on the shaft and the power of the spring is not sufficient to pull the Escapement lever home and rotate the type wheel without it is very strong Consequently it sometimes starts the break wheel is not released by breaking & closing the Local Printing circuit in two places it allows the play

Lever to fly back before the type wheel starts
Consequently there is no friction on the
shaft when this takes place
There is one disadvantage to this and
that is the great number of points of
Contact
I have dispensed with this and use
it Mechanically thus

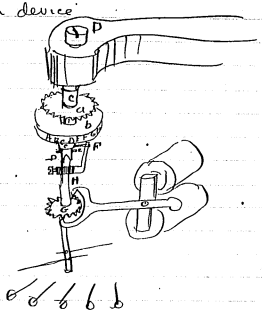


G is the shaft which is revolved by the
Escapement C is the Collar or sleeve on which
is the type wheel a Connector wheel b
Now this sleeves is larger than the shaft
and consequently will move sideways
slightly D is the printing lever
F is a rigid arm having a round forked end
around the sleeve and is just long
Enough to throw the wheel sideways
motion or shake in the sleeve towards the
printing lever,
Now when the printing lever is closed
the whole pressure Comes on the arm
E and not on the shaft G consequently
when the Escapement acts on the shaft G
to rotate it there is no friction or pressure
~~of the~~ from the Ptg lever,

Jany 31 1872

Jos J. Murray

another device



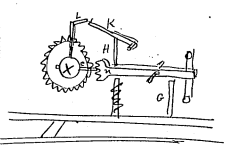
a the corrector b type wheel F Carrier,
C Sleeve D long center screw on which
sleeve & type W turn E pin keep sleeve
in centre screw H shaft G escapement
In this Case ~~shaft H don't Carry arm~~
The type wheel is not on the shaft
H but on its upper Center screw
it being carried around by a dog
or Carrier F secured to the shaft
H provided with a slot (aa)
into which is a pin from the type
wheel sleeve C - having sufficient
lateral motion to ~~it~~ allow of the type
wheel being corrected, the worm or unison
may be on the shaft or on the sleeve
In transmitting it is necessary to throw
the unison out. This I can do by
bringing the printing lever up a
little toward the type wheel
or by throwing the unison arm out
laterally - the Engine can be
stopped always in a given position
by the action of the ratchet so as to
ensure that it will start off when

The current is put on which it dont always do now,

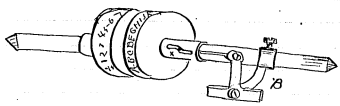
Feby 6th 1872 T A Edison

I will mention here that it may not be necessary to arrest the break wheel at all with this printing telegraph The Circuit might be opened by an action derived from the pin on the type wheel shaft and the springs a circuit opener being on these springs or alternate so that when the ~~pin~~ Come in load with a key it would open the main Circuit just at that moment when the key was raised closed it the break wheel going constantly would at all times furnish breaks but can they would be nullified by opening the circuit =

Unson



The revolution of Escapement Shaft or rather of type wheel shaft X brings pin C in tooth of rack n lifts it one tooth next revolution one more tooth & so on until the arm H throws arm K in path of L when shaft is arrested when pin C leaves cog the arm G throws Rack n down again & so on



Two type wheels, fraction & letter wheel
Letter wheel set so that the letter will be opposite space on fraction wheel
So that when it is printing from fraction wheel will not print its space coming over pad by revolving type wheels round right position
Closing pin over the 7 piece shifts the pin in the slot X and cams the fraction wheel ahead & right to print & same time throwing letter wheel behind so its space will come over pad
It can be done on one wheel
Letter then a figure letter then figure & so on when 60 characters 30 teeth in Escapement
Each tooth shows two letters
So every other one being a letter
Letter only print now
Come round to right position
shift and come wheel slightly ahead then fractions & figures will be right to print & letter not

February 6th 1872.

T A Edison
Inventor

1

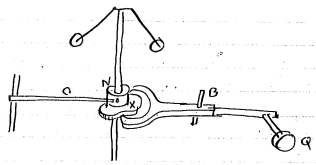
In my universal I have placed the Engine directly beneath the Printing Machine and underneath the base thereby making the Machine much More compact

The break wheel on my Universal has two Closures or metallic teeth and between these teeth is filled with Ivory, It is not necessary to have anything there as a limiting join might be used on the arm Carrying the Contact rollers, Still I prefer to use Some substance between these Contact teeth So that the roller will not knock their edges off and also to prevent noise, Now I have found in Experimenting that glass is the best thing that I can use as the Spark does not interfere with it as much as rubber ivory bone Etc and what is still better agate or garnet Could Substituted

There is considerable oxide formed on this Contact point and I propose to use a brush rubbing continuously up it to keep it clean also upon the Contact roller

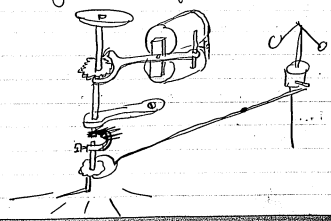
I will mention that the break wheel or pulsator may be made of metal Entirely and no cleats in it and the Vibrating arm may have a Contact spring upon it and this would be held and taken off as the wheel vibrates

It is not necessary that the pulsator should be exactly as I now use it is may be made thus



C is the arm arranged to the Escapement lever N is the wheel carried around by friction X is a flange on it which has two wavy teeth B is a lever which closes & opens the main circuit on the point Q the Vibration being had by the rotation of X and the two wavy teeth,

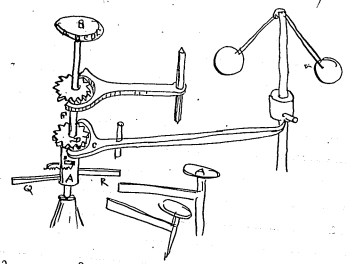
I have shown in former description the type wheel is arrested by the key 1/2 way home Consequently there must be some device to throw the type wheel in the right position to print, I can get rid of this device thus



In this Case the type wheel, Escapement etc is precisely like those in ordinary printers, but an extra shaft on which is a star wheel this star wheel giving motion to a lever which arrests the pulsator, now this second lever runs under the base and is stopped by the keys, the type wheel shaft will always be right for printing when starting running, but the extra lever which is carried around by the type wheel shaft will be arrested in a position to throw the arrester arm into the path of the pin on the pulsator,

This arrangement can be done with one shaft, the extra shaft being replaced by a sleeve

Thus



F is the main shaft, S a wheel which gives motion to the arresting lever C A is a sleeve with this wheel D on also with the key arm Q and R B is a slot having a pin in it and a spring fastened to the

sleeve to pull it around against the pin Now when a key is closed the escapement rotates around till it stops home but just as it is going home the arm on the sleeve comes against a key and the sleeve is arrested and the pulsator is caught but the escapement lever pulls the type wheel home the dead motion in the slot allowing this, the moment the key rises the spring pulls the sleeve up around instantly against the pin in the slot B before the type wheel shaft starts to move.

An extra magnet might be used to rotate the shaft which has arms on and the escapement lever have arm which arrest pulsator, and the Type wheel shaft be entirely independent and be rotated by another magnet & escapement lever or a springy connection might be attached from the escapement lever which rotates the type wheel shaft to the lever which rotates the key shaft & the extra magnet dispensed with,

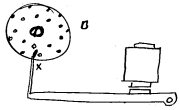
February 7th 1872

Witnessed

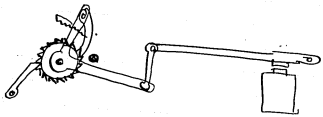
T. A. Edison

I have tried nearly all kinds of self acting breaks upon the Escapment lever of the Universal. so as to dispense with the Engine. but a change of adjustment of that lever increases or decreases the speed whereas the Engine does not to any great extent, another defect in a self acting break is that it is a very hard matter to regulate the break

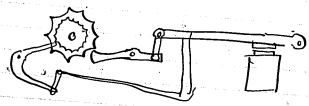
Escapement



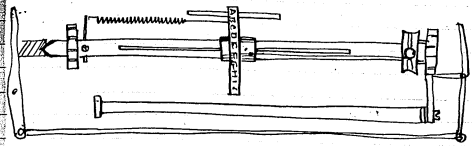
X is a dog with a Cam end B a face pin wheel, when it goes up it Cams ahead by the inner row coming down by the outer row ———

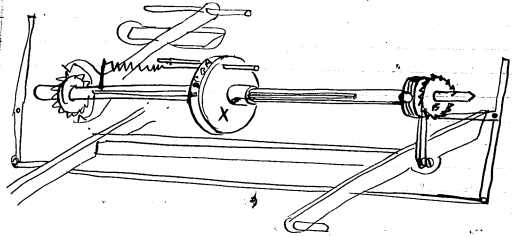


Another Escapement



main Generator

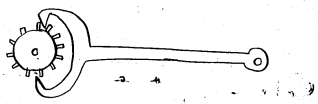




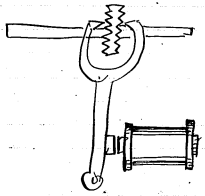
Travelling type wheel this wheel is rotated the same way as the ordinary printing Machine by an Escapement etc
The shaft is provided with a Key seat which the sleeve and type wheel travel Endwise B is a ratchet having a pulley by its side and this ratchet is rotated by a pawl from the printing Zone there is a string leading from the type wheel to this pulley which turns the corner on a little pulley wheel the other end of the type wheel is attached a spring

Now every time the type wheel is printed from the upward movement of the pty lever winds the string up the distance of one letter. when the type wheel reaches its full length it throws out the detention click and the spring pulls the type wheel back to its starting point and restores the detention click. an attachment may be made with the detention click to feed the paper a line ahead when it is moved

I am going to get up a machine with 26 trains of differential gearing Each gear having a letter of the alphabet and taking a hundred words and turn the gearing in such a manner that a few letters will be the result of these hundred words These letters can be transmitted over Atlantic Cable and then another machine in London can be set at these letters and rotated backward until the 100 wds are indicated I can then indicate or print the result

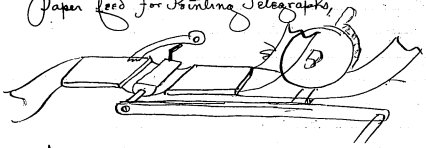


Escapement wedge acting square teeth,

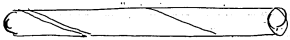


This is an old invention of mine but I record it,

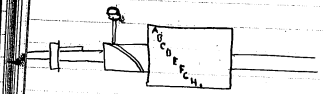
Paper feed for Printing Telegraphs,



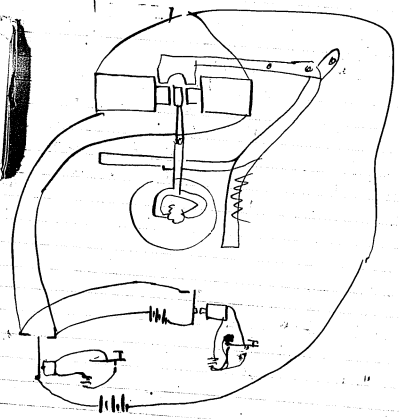
When you bow the paper the click prevents it coming back but when the bower attached to the printing lever goes up it lifts the click off and the paper straightens out by its own action thus throwing itself right for the next letter, Tried in 1869,



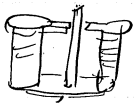
Feby 10 1872 T A Edison



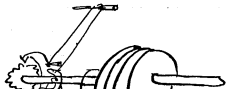
Type wheel with the letters placed as shown so as to get as small a diameter as possible, a twist drill might be used on the letters. Cut along the twist and beveled so that for every movement of the ratchet a new letter would come into position a pin following in the groove would give the endless motion and the ratchet would give the rotary motion after the drill or shaft having types would read it but it would be thrown back instantly by lifting out the pin in the groove and by a spring

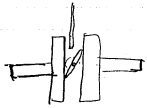


Device for a two wire instrument, close current on one wire one magnet draws escapement armature one way close on other wire other magnet draws the other way close both mag. circuits and both magnets close bringing down printing lever,



polarized relay bad iron or residual magnetism used only no steel,





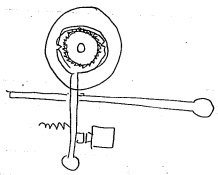
Device for using two type wheels having 15 character on one and 15 on the other and 15 teeth in the escapement and a shifter on the shaft so that in rotating it will shift on one & then the other

I claim slowing a printing lever by a piston attached to the printing lever run in a tube of mercury

Feby 12 1872

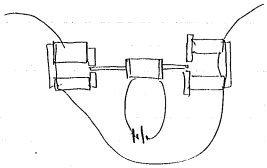
T A Edison

any of the arrangements described in my description of an apparatus invented for Andrews described in another book Can be applied to the printing lever



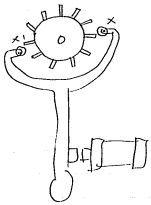
60 characters on the wheel 60 teeth in the Escapement figure between each letter stop on Open circuit to print letters (red) on closed circuit to print fractions and figures

My Wife = Cath Prudence
Poppy Wappy

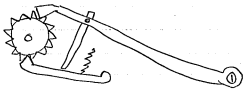


Polarized Relay Tones being polarized by a local battery Model Constructed in 1869 - Tuning Effects possession

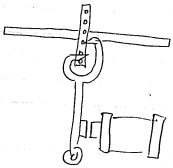
Escapement



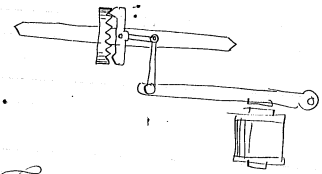
x x' Little wheels



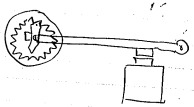
Escapement



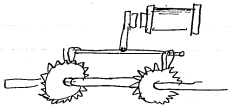
Escapement with Pin Wheel



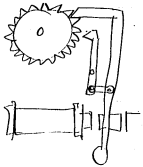
Crown wheel Escapement

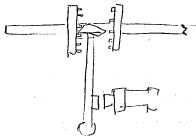


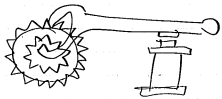
Inside star wheel Escapement



Double star wheel Escapement

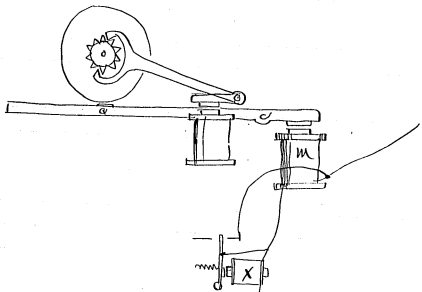






Inside & outside star wheel Escapement

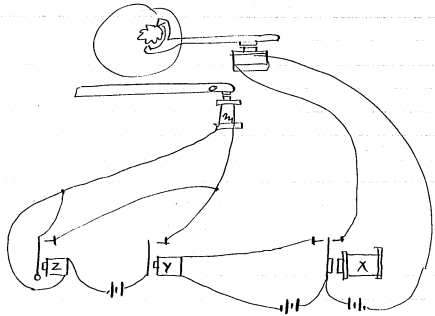
Feby 14 1872 T. A. Edison



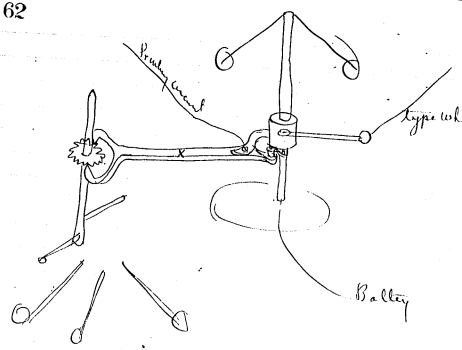
M is the printing Magnet X is an iron Magnet in same circuit, they both respond together but when the printing Lever just touches the type W the relay points close and cut it out and it flies back

9. Use this device for slowly upstream performing this operation

Thus



X is the main line relay front point vibrating Works type wheel around now when Type wheel in right position open Main Line relay Lever X flies back Closes Relay Y which closes printing circuit in which is Cut off relay Z and printing Magnet - M - both close and the Moment letter is printed Relay Z Cuts Current out of printing Magnet and Lever flies back



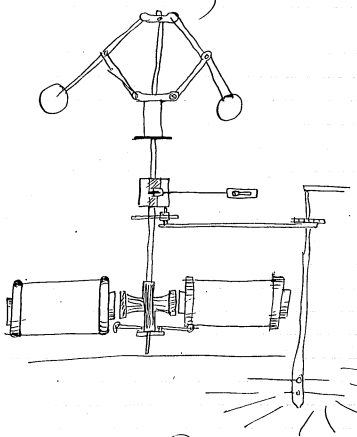
On the break wheel is a plate which has two teeth bevelled X is an arm having 2 prongs, one each of which is two little pinion rollers
(Fig) Every revolution of the Break wheel and the pinions engaging with the bevelled pins an intermittent motion is given arm X which acting on the Escapement wheel Rotates for Every revolution of the break wheel the ratchet is advanced two teeth there being 2 breaks on break wheel
(Fig) 2 bevelled pins, one prong is only necessary by using an spring in place of the other,

by depressing a Key the ratchet wheel shaft is arrested thus allows the arm X which arrests break wheel,

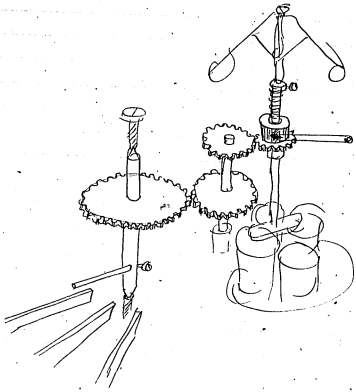
one of these prongs is insulated and Connected to the printing wire And when the break wheel is suddenly arrested the roller comes in Contact with the ~~bev~~ bevelled ~~tooth~~ (Fig) closes the printing current, I have a machine already made,

Feby 16 1872.

T. A. Edison



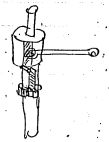
Arrangement of the Break in the Instrument



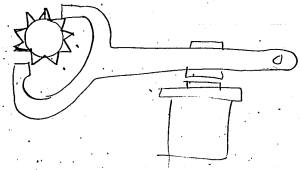
Universal break wheel working shaft that has stops on for arresting by keys (with gear wheels, I have previously shown & described) working with a rotated wheel for the rotated or intermittent revolution gear a Geneva stop wheel might be used in place of the gear having 30 stops on the shaft wheel & one on the break or more.

Feby 26th

This gear was previously suggested to Dean Feby 1. and thought before while working description on page 29

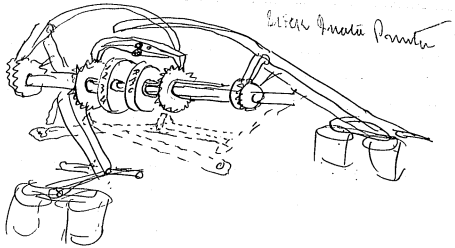


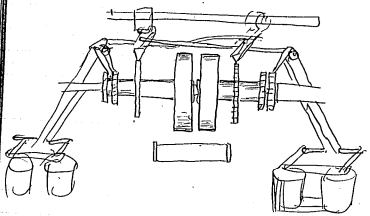
Carrier for break on the universal joint



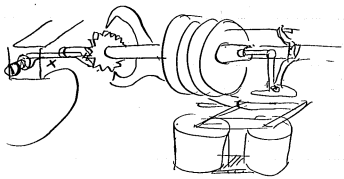
I claim Turning a type wheel by an engine (electric) or releasing it step by step by an Escapement (2) Magnet the pulsations being derived from ~~an~~ a break on the shaft of the Engine which rotates the type wheel =

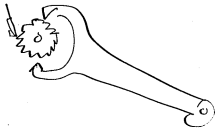
Unison For Callahans 8 wire Machine

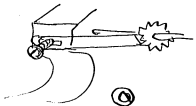


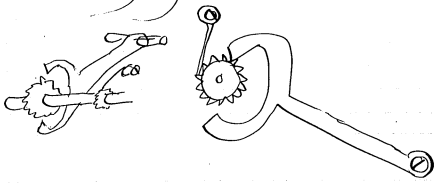


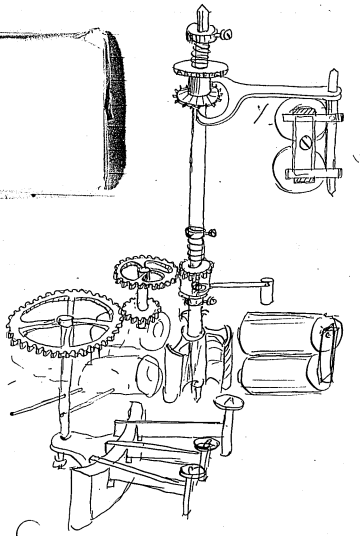
attachment to Universal Stock Printers, to prevent backlash in Escapement wheel when they are run at High Speed.









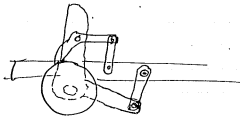


Printing Telegraph Machine The Engine shaft carrying the type wheel released by the escapement lever of the engine

March 6th 1872

G H Dawson

Inventor



Positive Paper Feed for Printing Telegraphs

May 24 1874. Vive la Republique!

To give a Moiré Antique appearance to Line like they put on Lee coats. Cover the line with Chloride of Cobalt & then in dil. Sulph. Ac.

Electromalorgraph Jany 2 1875

Caustic Soda Tin On Eltn O & H. phenomenal
Carb Cadmium Metal pen on H good "
Molybdate Soda Na Cl Tin on O mark. Tin on O
100 tremendous friction increased phenomenal
Cl Pb – Na Cl Platina & other good.
Carb Am, Tin Sticks fearful on O.
Carb Cadmium + Na Cl Tin stix on O fearful

18

Manganate Chl Chromate – phenomenal –
Simply fail on pen to
Eltn H or O. slight mark with
2 Cells Eltn. very bl of mark
left on brass flat with in O & H.
Can't get it on
brass pen Chl Na Eltn
EMG brass
lead not very good Mercy
brass
on both best on H.

January 2nd 1875 –

Experiment to obtain a good solution upon which to receive Tellurium marks also to ascertain if on this good solution Tellurium marks can be wiped out by Electricity or some Solution put on the marks.
Also to find a platina solution delicate, also to obtain a cheap delicate solution on other metal

Hypochlorite Calcium wipes out Tellurium marks Completely

Oxide Bismuth + Na Cl Platina on H. Te good
Platina wipes out Te splendid on O.

Bichloride Hg. Na Cl. Platina on H.

Chromate K + Na Cl. Platina on O. blots Te. Te good but leaves yellow mark after blotting

Cuxbhonate Manganese. Na Cl. Tin on H. Lead on H
Cl Pb – P pen Hyposulph soda marks good on H. gofer this

Caustic Baryta P on H faint mark.
Bromide of Potash Platina on O wipes out Te. leaves slight yellow mark

Nitrate Lead. Platina on both H best mark when you first touch "Musical sound as drawing along"

Hyposulph Soda. Cl Pb + Cl K. + Causlick K.

Carb Am. Na Cl. Lead on H
Molybdate Soda Tin pen marks on O.

Te marks splendid on Cl. K. best

Nitrate Soda Te Splendid
Nitrate Silver Per. C good.
Carbonate Per. Tin see slight mark. may be good.
Ch Magnesia Hydrochlor Marks on O. good Te bad

Dissemmer

Bisulphate Soda & Sul Zinc
Te fumes and spreads, hurts eyes & parched smell.

Cl Cadmium Te marks Splendid. P on O wipes mark out

Carb Cadmium & NaCl. Te good. P on O wipes it out good.

Molybdate Am – NaCl. Lead on H. Te good

Phosphate Soda & NaCl. Lead Splendid delicate on Te. dont show so black next morning though

Urate Am – NaCl. Te no good Lead splendid on H black in morning
Sul Lime NaCl. Te good P on O blots good

Bisulphate K. Te fair P on O blots fair

Ch Magnesium & NaCl. Te Splendid
P on O blots, Splendid Lead gives splendid mark on H not very black in morning

Phosphate ~~Manganese~~ Magnesia
Lead on H Splendid – Not very black in morning

Phosphate Am – NaCl. Te good P on O wipes out slowly

Carb Baryta NaCl. Te good P on O wipes out quick

Phosphate Soda NaCl. Te not very good P marks on H good, P6 splendid on H not extra black in morning

Boro Tin Te Hardly marks.

Bisulphite Soda Te good

Oxide Chromic Te good P on O blots.

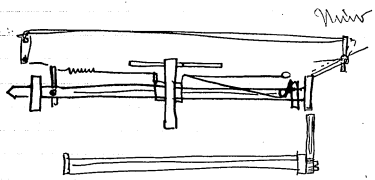
Nitrate Lime & NaCl. Te good P blots it out on O Extra black in morning

Bisulphate K NaCl. Very phenomenal
Te good spreads fearful. P on O wipes beautiful, leaves white mark where Te spreads thinly the white mark delicate if could be done Cheap would give good P solution

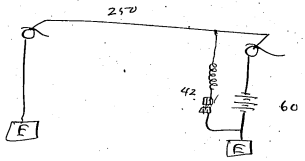
Mch 14th 1875

Leeds for plat selection

Rhubarb root marks faint points on it



Pointing above Telegh travelling type wheel



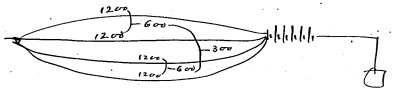
13
90
1170.

12.00

500
4

42

$13\frac{1}{2}$
50
650



24.